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PATENT APPLICATION  
Mo6495  
LeA 33,544

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

APPLICATION OF )  
JÖRG HOFMANN ET AL ) PCT/EP00/00727  
SERIAL NUMBER: TO BE ASSIGNED )  
FILED: HEREWITH )  
TITLE: DOUBLE METAL CYANIDE )  
CATALYSTS FOR PRODUCING )  
POLYETHER POLYOLS )

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231  
Sir:

Please enter the following amendments and consider the following remarks in support of the enclosed application:


"Express Mail" mailing label number ET146894475US

Date of Deposit August 7, 2001

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner of Patents and Trademarks, Washington, D.C. 20231

Donna J. Veatch

(Name of person mailing paper or fee)

  
Signature of person mailing paper or fee

IN THE SPECIFICATION:

On page 1 and page 20 (the Abstract), please delete the title and insert

--DOUBLE METAL CYANIDE CATALYSTS FOR  
PRODUCING POLYETHER POLYOLS--

IN THE CLAIMS:

Please cancel Claims 1-11.

Please add the following new Claims 12-25:

--12. A double-metal cyanide catalyst comprising:

- a) at least one double-metal cyanide compound;
- b) at least one organic complex ligand which is not a bile acid, a bile acid salt, a bile acid ester or a bile acid amide; and
- c) at least one bile acid, bile acid salt, bile acid ester or bile acid amide.

13. The double-metal cyanide catalyst according to Claim 12, further comprising water and/or one or more water-soluble metal salts.

14. The double-metal cyanide catalyst according to Claim 12, wherein the double-metal cyanide compound is zinc hexacyanocobaltate (III).

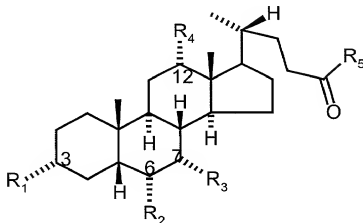
15. The double-metal cyanide catalyst according to Claim 12, wherein the organic complex ligand comprises an alcohol, aldehyde, ketone, ether, ester, amide, urea, nitrile, sulfide and/or a mixture thereof.

16. The double-metal cyanide catalyst according to Claim 12, wherein the organic complex ligand is tert-butanol.

17. The double-metal cyanide catalyst according to Claim 12, wherein the bile acid, bile acid salt, bile acid ester or bile acid amide is present in amount of from about 1 to about 80 wt. %, based on the amount of finished double-metal cyanide catalyst.

18. The double-metal cyanide catalyst according to Claim 12, wherein the bile acid, bile acid salt, bile acid ester or bile acid amide is present in an amount of from about 1 to about 40 wt.%, based on the amount of finished double-metal cyanide catalyst.

19. The double-metal cyanide catalyst according to Claim 12, wherein the bile acid is represented by the general formula:



wherein

$R_1, R_2, R_3, R_4$ , independently, represent H or OH and

$R_5$  represents OH,  $\text{NH-CH}_2\text{-CH}_2\text{-SO}_3\text{H}$ ,  $\text{NH-(CH}_2\text{)}_3\text{-N}^+(\text{CH}_3)_2\text{-(CH}_2\text{)}_3\text{-SO}_3^-$ ,  $\text{NH-(CH}_2\text{)}_3\text{-N}^+(\text{CH}_3)_2\text{-CH}_2\text{-CHOH-CH}_2\text{-SO}_3^-$  or  $\text{NH-CH}_2\text{-COOH}$ .

20. The double-metal cyanide catalyst according to Claim 12, wherein the bile acid salt is the sodium, lithium or potassium salt or the methyl or ethyl ester of cholic acid, glycocholic acid, taurocholic acid, deoxycholic acid, glycodeoxycholic acid, taurodeoxycholic acid, chenodeoxycholic acid, glycochenodeoxycholic acid, taurochenodeoxycholic acid, lithocholic acid, hyocholic acid, hyodeoxycholic acid or a mixture thereof.

21. A process for the preparation of a double-metal cyanide catalyst according to Claim 12, comprising the steps of: (a) reacting, in aqueous solution, (i) at least one metal salt, (ii) with at least one metal cyanide salt, in the presence of (iii) an organic complex ligand, which is not a bile acid, a bile acid salt, a bile acid ester, or a bile acid amide, to form a suspension; and (b) treating the suspension with at least one bile acid, bile acid salt, bile acid ester or bile acid amide.

22. A process according to Claim 21, further comprising the steps of: (c) isolating the catalyst from suspension after (b); (d) washing the isolated catalyst; and (e) drying the isolated catalyst.

23. A process for the production of a polyether polyol by polyaddition of an alkylene oxide onto a starter compound containing active hydrogen atoms in which the polyaddition of alkylene oxide is conducted in the presence of the double-metal cyanide catalyst of Claim 12.

24. A polyether polyol prepared by the process of Claim 21.

25. A double-metal cyanide catalyst according to Claim 12, wherein the double-metal cyanide catalyst is used for the production of a polyether polyol by polyaddition of an alkylene oxide onto a starter compound having active hydrogen atoms.--

### REMARKS

Claims 1-11 have been cancelled and rewritten as new Claims 12-25 in an effort to place them in better form.

New Claim 12 corresponds to the subject matter claimed in original Claim 1.

New Claim 13 corresponds to the subject matter claimed in original Claim 2.

New Claim 14 is directed to the subject matter of original Claim 3.

Support for new Claim 15 is found on page 5, lines 8-9.

New Claim 16 is directed to the subject matter of original Claim 4.

New Claim 17 is directed to the subject matter of original Claim 5.

Support for new Claim 18 is found on page 5, lines 21-22.

New Claim 19 is directed to the subject matter of original Claim 6.

New Claim 20 is directed to the subject matter of original Claim 7.

Support for new Claim 20 is found on page 7, lines 16-20.

New Claim 21 is directed to the subject matter of original Claim 8.

Support for new Claim 21 is found on page 9, lines 3-5.

New Claim 22 is directed to the subject matter of original Claim 8.

New Claim 23 is directed to the subject matter of original Claim 9.

New Claim 24 is directed to the subject matter of original Claim 10.

New Claim 25 is directed to the subject matter of original Claim 11.

Applicants respectfully submit that no new matter has been added by these amendments.

In view of the preceding amendments and remarks, Applicants respectfully request an early action on the merits.

Respectfully submitted,

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION:**

On page 1 and page 20 (the Abstract), please delete the title and insert

**--DOUBLE METAL CYANIDE CATALYSTS FOR  
PRODUCING POLYETHER POLYOLS--**

**IN THE CLAIMS:**

Claims 1-11 have been canceled.

Claims 12-25 have been added as follows:

--12. A double-metal cyanide catalyst comprising:

- a) at least one double-metal cyanide compound;
- b) at least one organic complex ligand which is not a bile acid, a bile acid salt, a bile acid ester or a bile acid amide; and
- c) at least one bile acid, bile acid salt, bile acid ester or bile acid amide.

13. The double-metal cyanide catalyst according to Claim 12, further comprising water and/or one or more water-soluble metal salts.

14. The double-metal cyanide catalyst according to Claim 12, wherein the double-metal cyanide compound is zinc hexacyanocobaltate (III).

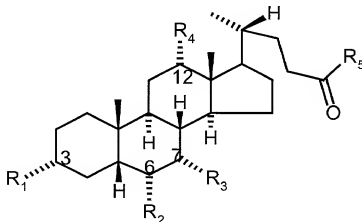
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16. The double-metal cyanide catalyst according to Claim 12, wherein the organic complex ligand is tert.-butanol.

17. The double-metal cyanide catalyst according to Claim 12, wherein the bile acid, bile acid salt, bile acid ester or bile acid amide is present in amount of from about 1 to about 80 wt. %, based on the amount of finished double-metal cyanide catalyst.

18. The double-metal cyanide catalyst according to Claim 12, wherein the bile acid, bile acid salt, bile acid ester or bile acid amide is present in an amount of from about 1 to about 40 wt.%, based on the amount of finished double-metal cyanide catalyst.

19. The double-metal cyanide catalyst according to Claim 12, wherein the bile acid is represented by the general formula:



wherein

$R_1, R_2, R_3, R_4$ , independently, represent H or OH and

$R_5$  represents OH,  $\text{NH-CH}_2\text{-CH}_2\text{-SO}_3\text{H}$ ,  $\text{NH-(CH}_2\text{)}_3\text{-N}^+(\text{CH}_3\text{)}_2\text{-(CH}_2\text{)}_3\text{-SO}_3^-$ ,  $\text{NH-(CH}_2\text{)}_3\text{-N}^+(\text{CH}_3\text{)}_2\text{-CH}_2\text{-CHOH-CH}_2\text{-SO}_3^-$  or  $\text{NH-CH}_2\text{-COOH}$ .

20. The double-metal cyanide catalyst according to Claim 12, wherein the bile acid salt is the sodium, lithium or potassium salt or the methyl or ethyl ester of cholic acid, glycocholic acid, taurocholic acid, deoxycholic acid, glycodeoxycholic acid, taurodeoxycholic acid, chenodeoxycholic acid, glycochenodeoxycholic acid, taurochenodeoxycholic acid, lithocholic acid, hyocholic acid, hyodeoxycholic acid or a mixture thereof.

21. A process for the preparation of a double-metal cyanide catalyst according to Claim 12, comprising the steps of: (a) reacting, in aqueous solution, (i) at least one metal salt, (ii) with at least one metal cyanide salt, in the presence of (iii)



an organic complex ligand, which is not a bile acid, a bile acid salt, a bile acid ester, or a bile acid amide, to form a suspension; and (b) treating the suspension with at least one bile acid, bile acid salt, bile acid ester or bile acid amide.

22. The process according to Claim 21, further comprising the steps of: (c) isolating the catalyst from suspension after (b); (d) washing the isolated catalyst; and (e) drying the isolated catalyst.

23. A process for the production of a polyether polyol by polyaddition of an alkylene oxide onto a starter compound containing active hydrogen atoms in which the polyaddition of alkylene oxide is conducted in the presence of the double-metal cyanide catalyst of Claim 12.

24. A polyether polyol prepared by the process of Claim 21.

25. A double-metal cyanide catalyst according to Claim 12, wherein the double-metal cyanide catalyst is used for the production of a polyether polyol by polyaddition of an alkylene oxide onto a starter compound having active hydrogen atoms.--

DOUBLE METAL CYANIDE CATALYSTS FOR  
PRODUCING POLYETHER POLYOLS

ABSTRACT OF THE DISCLOSURE

The invention provides new double metal cyanide (DMC) catalysts for preparing polyetherpolyols by the polyaddition of alkylene oxides to starter compounds which contain active hydrogen atoms, wherein the catalyst comprises a) double metal cyanide compounds, b) bile acids or their salts, esters or amides and c) organic complex ligands. The catalysts according to the invention show greatly increased activity during preparation of a polyetherpolyol.

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